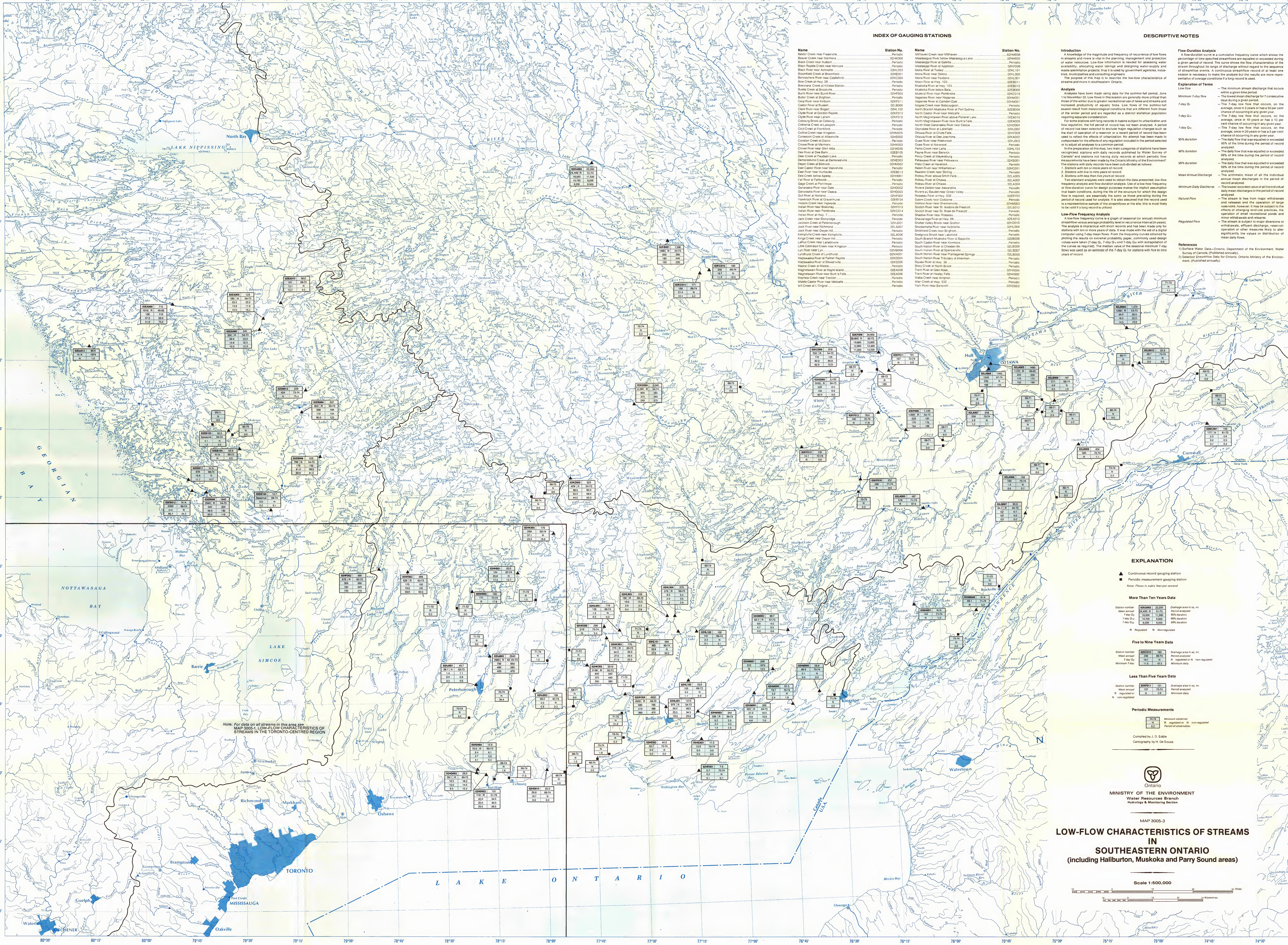

INDEX OF GAUGING STATIONS

Name	Station No.
Baxter Creek near Fraserville	Periodic
Beaver Creek near Marmora	02HK006
Black Creek near Hulbert	Periodic
Black Rapids Creek near Merivale	Periodic
Black River near Actinolite	02HL003
Bloomfield Creek at Bloomfield	02HE001
Bonnechere River near Castleford	02KC009
Bow Creek at Hwy. 28	Periodic
Brennans Creek at Killaloe Station	Periodic
Buells Creek at Brockville	Periodic
Burnt River near Burnt River	02HF003
Butler Creek at Brighton	Periodic
Carp River near Kinburn	02KF011
Castor River at Russell	02LB006
Clare River near Bogart	02HL102
Clyde River at Gordon Rapids	02KF013
Clyde River near Lanark	02KF010
Cobourg Brook at Cobourg	Periodic
Colborne Creek at Lakeport	Periodic
Cold Creek at Frankford	Periodic
Collins Creek near Kingston	02HM005
Consecon Creek at Allisonville	02HE002
Constan Creek at Dacre	Periodic
Crowe River at Marmora	02HK003
Crowe River near Glen Alda	02HK005
Dee River at Dee Bank	02EB105
Deer Creek at Paudash Lake	Periodic
Demorestville Creek at Demorestville	02HE003
Depot Creek at Bellrock	02HM002
East Castor River near Marvelville	Periodic
East River near Huntsville	02EB013
Eels Creek below Apsley	02HH001
Fall River at Fallbrook	Periodic
Gage Creek at Port Hope	Periodic
Ganaraska River near Dale	02HD002
Ganaraska River near Osaca	02HD003
Gull River at Norland	02HF002
Hawkrock River at Gravenhurst	02EB104
Hoople Creek near Ingleside	Periodic
Indian River near Blakeney	02KF012
Indian River near Pembroke	02KC014
Indian River at Hwy. 7	Periodic
Jack Creek near Stonyridge	Periodic
Jackson Creek at Peterborough	02HJ001
Jock River near Richmond	02LA007
Jock River near Dwyer Hill	Periodic
Kemptville Creek near Kemptville	02LA006
Kings Creek near Dwyer Hill	Periodic
LaRue Creek near Lansdowne	Periodic
Little Cataraqui Creek near Kingston	Periodic
Lyn River near Lyn	02MB006
Lyndhurst Creek at Lyndhurst	02MA001
Madawaska River at Palmer Rapids	02KD004
Madawaska River at Stewartville	02KE005
Madoc Creek at Madoc	Periodic
Magnetawan River at Maple Island	02EA008
Magnetawan River near Burk's Falls	02EA006
Mayhew Creek near Trenton	Periodic
Middle Castor River near Metcalfe	Periodic
Mill Creek at L'Orignal	Periodic
Millhaven Creek near Millhaven	02HM006
Mississagua River below Mississagua Lake	02HH002
Mississippi River at Galetta	Periodic
Mississippi River at Appleton	02KF006
Moira River at Tweed	02HL101
Moira River near Deloro	02HL005
Moira River near Foxboro	02HL001
Moon River at Hwy. 103	02EB011
Muskoka River at Hwy. 103	02EB012
Muskoka River below Bala	02EB006
Muskrat River near Pembroke	02KC015
Napanee River near Napanee	02HM001
Napanee River at Camden East	02HM007
Nogies Creek near Bobcaygeon	Periodic
North Branch Muskoka River at Port Sydney	02EB004
North Castor River near Metcalfe	Periodic
North Magnetawan River above Pickerel Lake	02EA010
North Magnetawan River near Burk's Falls	02EA005
North West Ganaraska River near Osaca	02HD004
Otonabee River at Lakefield	02HJ002
Ottawa River at Chats Falls	02KF009
Ottawa River at Des Joachims	02KA002
Ouse River near Westwood	02HJ003
Ouse River at Norwood	Periodic
Parks Creek near Latta	02HL103
Payne River near Berwick	Periodic
Percy Creek at Meyersburg	Periodic
Petawawa River near Petawawa	02KB001
Plato Creek at Havelock	Periodic
Raisin River near Williamstown	02MC001
Rawdon Creek near Stirling	Periodic
Rideau River above Smith Falls	02LA005
Rideau River at Ottawa	02LA002
Rideau River at Ottawa	02LA004
Riviere Delisle near Alexandria	Periodic
Riviere au Baudet near Green Valley	Periodic
Rosseau River at Hwy. 532	02EB103
Salem Creek near Colborne	Periodic
Salmon River near Shannonville	02HM003
Scotch River near St. Isadore de Prescott	02LB012
Scotch River near St. Rose de Prescott	Periodic
Shadow River near Rosseau	Periodic
Shawanaga River at Hwy. 69	02EA012
Shelter Valley Brook near Grafton	02HD010
Skootamatta River near Actinolite	02HL004
Smithfield Creek near Brighton	Periodic
Snelgrove Brook near Lakefield	Periodic
South Branch Muskoka River at Baysville	02EB008
South Castor River near Kenmore	Periodic
South Nation River at Chesterville	02LB009
South Nation River at Spencerville	02LB007
South Nation River near Plantagenet Springs	02LB005
South Nation River Tributary at Inkerman	Periodic
Squaw River at Hwy. 36	Periodic
Story Creek at North Brook	Periodic
Trent River at Glen Ross	02HK004
Trent River at Healey Falls	02HK002
Waba Creek near Arnprior	Periodic
Wier Creek at Hwy. 532	Periodic
York River near Bancroft	02KD002

DESCRIPTIVE NOTES

Introduction

A knowledge of the magnitude and frequency of recurrence of low flows in streams and rivers is vital in the planning, management and protection of water resources. Low-flow information is needed for assessing water availability, allocating water takings and designing water-supply and waste-assimilation projects; thus it is used by government agencies, industries, municipalities and consulting engineers.

The purpose of this map is to describe the low-flow characteristics of streams and rivers in southeastern Ontario.

Analysis

Analyses have been made using data for the summer-fall period, June 1 to November 30. Low flows in this season are generally more critical than those of the winter due to greater recreational use of lakes and streams and increased productivity of aquatic biota. Low flows of the summer-fall season result from meteorological conditions that are different from those of the winter period and are regarded as a distinct statistical population requiring separate consideration.

For some stations with long records in basins subject to urbanization and flow regulation, the full period of record has not been analyzed. A period of record has been selected to exclude major regulation changes such as the start of operation of a reservoir or a recent period of record has been used to reflect the effects of urbanization. No attempt has been made to compensate for the effects of any regulation included in the period selected or to adjust all analyses to a common period.

In the preparation of this map, two main categories of stations have been recognized: stations with daily records published by Water Survey of Canada[1] and stations not having daily records at which periodic flow measurements have been made by the Ontario Ministry of the Environment[2]. The stations with daily records have been sub-divided as follows:

1. Stations with ten or more years of record.
2. Stations with five to nine years of record.
3. Stations with less than five years of record.

Two standard analyses were used to obtain the data presented; low-flow frequency analysis and flow-duration analysis. Use of a low-flow frequency or flow-duration curve for design purposes makes the implicit assumption that basin conditions, during the life of the structure for which the design flow is required, are essentially the same as those prevailing during the period of record used for analysis. It is also assumed that the record used is a representative sample of the streamflows at the site; this is most likely to be valid if a long record is utilized.

Low-Flow Frequency Analysis

A low-flow frequency curve is a graph of seasonal (or annual) minimum streamflow versus average probability level or recurrence interval (in years). The analysis is impractical with short records and has been made only for stations with ten or more years of data. It was made with the aid of a digital computer using 7-day mean flows. From the frequency curves obtained by plotting the results on extremal probability paper, commonly used design values were taken (7-day Q_2, 7-day Q_{10} and 7-day Q_{20} with extrapolation of the curves as required). The median value of the seasonal minimum 7-day flows was used as an estimate of the 7-day Q_2 for stations with five to nine years of record.

Flow-Duration Analysis

A flow-duration curve is a cumulative frequency curve which shows the percentage of time specified streamflows are equalled or exceeded during a given period of record. The curve shows the flow characteristics of the stream throughout its range of discharge without regard to the sequence of streamflow events. A continuous streamflow record of at least one season is necessary to make the analysis but the results are more representative of average conditions if a long record is used.

Explanation of Terms

Low flow	— The minimum stream discharge that occurs within a given time period.
Minimum 7-day flow	— The lowest mean discharge for 7 consecutive days during a given period.
7-day Q_2	— The 7-day low flow that occurs, on the average, once in 2 years or has a 50 per cent chance of occurring in any given year.
7-day Q_{10}	— The 7-day low flow that occurs, on the average, once in 10 years or has a 10 per cent chance of occurring in any given year.
7-day Q_{20}	— The 7-day low flow that occurs, on the average, once in 20 years or has a 5 per cent chance of occurring in any given year.
95% duration	— The daily flow that was equalled or exceeded 95% of the time during the period of record analyzed.
98% duration	— The daily flow that was equalled or exceeded 98% of the time during the period of record analyzed.
99% duration	— The daily flow that was equalled or exceeded 99% of the time during the period of record analyzed.
Mean Annual Discharge	— The arithmetic mean of all the individual annual mean discharges in the period of record analyzed.
Minimum Daily Discharge	— The lowest recorded value of all the individual daily mean discharges in the period of record analyzed.
Natural Flow	— The stream is free from major withdrawals and releases and the operation of large reservoirs; however, it may be subject to the effects of changing land-use practices, the operation of small recreational ponds and minor withdrawals and releases.
Regulated Flow	— The stream is subject to major diversions or withdrawals, effluent discharge, reservoir operation or other measures likely to alter significantly the values or distribution of mean daily flows.

References

1) Surface Water Data—Ontario, Department of the Environment, Water Survey of Canada, (Published annually).
2) Selected Streamflow Data for Ontario, Ontario Ministry of the Environment, (Published annually).

EXPLANATION

▲ Continuous record gauging station
■ Periodic measurement gauging station

Note: Flows in cubic feet per second

More Than Ten Years Data

Station number	02KA002	22,200	Drainage area in sq. mi.
Mean annual	24,400 R	51-73	Period analyzed
7 day Q_2	16,000	11,500	95% duration
7 day Q_{10}	10,700	9,500	98% duration
7 day Q_{20}	9,200	8,500	99% duration

R Regulated N Non-regulated

Five to Nine Years Data

Station number	02KC015	183	Drainage area in sq. mi.
Mean annual	246	69-74	Period analyzed
7 day Q_2	18.7	N	R regulated or N non-regulated
Minimum 7 day	11.5	10.3	Minimum daily

Less Than Five Years Data

Station number	02KF011	101	Drainage area in sq. mi.
Mean annual	127	72-74	Period analyzed
R regulated or N non-regulated	N	0.9	Minimum daily

Periodic Measurements

70-74	Period of observation
N	R regulated or N non-regulated
6.2	Minimum observed

Compiled by J. D. Eddie
Cartography by H. De Souza

Ontario
MINISTRY OF THE ENVIRONMENT
Water Resources Branch
Hydrology & Monitoring Section

MAP 3005-3

LOW-FLOW CHARACTERISTICS OF STREAMS IN SOUTHEASTERN ONTARIO
(including Haliburton, Muskoka and Parry Sound areas)

Scale 1:500,000

Published 1977

Transverse Mercator Projection

MOE WATER RES MAP 3005-3 AMAJ